This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

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1. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

   Pringles wants to add 27 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

   The solution is About 8 percent, which is option B.

   A. About 13 percent

      This corresponds to solving correctly but treating both radius and height as equal contributors to the volume.

   B. About 8 percent

      * This is the correct option.

   C. About 3 percent

      This corresponds to not solving for the increase properly.

   D. About 14 percent

      This corresponds to treating both radius and height as equal contributors and not solving correctly.

   E. None of the above

      If you chose this, please contact the coordinator to discus how you solved the problem.

   General Comment: Remember that when plugging the increases of values in, you need to treat it as that percentage above 100. For example, a 5 percent increase means 105 percent.

---

2. For the scenario below, use the model for the volume of a cylinder as $V = \pi r^2 h$.

   Pringles wants to add 38 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?

   The solution is About 11 percent, which is option B.

   A. About 3 percent

      This corresponds to not solving for the increase properly.

   B. About 11 percent

      * This is the correct option.

   C. About 19 percent

      This corresponds to treating both radius and height as equal contributors and not solving correctly.

D. About 17 percent

This corresponds to solving correctly but treating both radius and height as equal contributors to the volume.

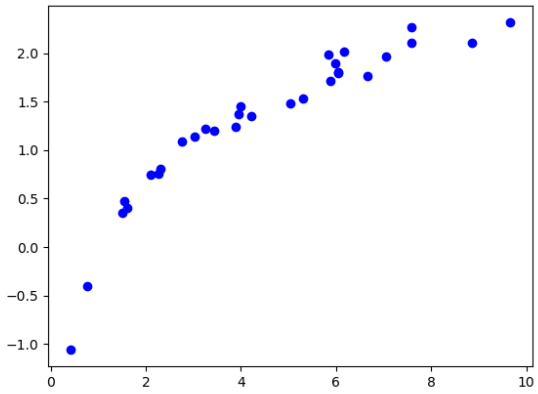
E. None of the above

If you chose this, please contact the coordinator to discus how you solved the problem.

General Comment: Remember that when plugging the increases of values in, you need to treat it as that percentage above 100. For example, a 5 percent increase means 105 percent.

---

3. Determine the appropriate model for the graph of points below.



The solution is Logarithmic model, which is option A.

A. Logarithmic model

For this to be the correct option, we want a rapid change early, then an extremely slow change later.

B. Non-linear Power model

For this to be the correct option, we need to see a polynomial or rational shape.

C. Linear model

For this to be the correct option, we need to see a mostly straight line of points.

D. Exponential model

For this to be the correct option, we want an extremely slow change early, then a rapid change later.

E. None of the above

For this to be the correct option, we want to see no pattern in the points.

General Comment: This question is testing if you can associate the models with their graphical representation. If you are having trouble, go back to the corresponding Core module to learn about the specific function you are having trouble recognizing.

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4. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 3 many cases reported, but the number of confirmed cases has doubled every 4 days. How long will it be until there are at least 1000 confirmed cases?

The solution is About 34 days, which is option A.

A. About 34 days

* This is the correct option.

B. About 14 days

You modeled the situation with e as the base and did not apply the properties of log correctly.

C. About 24 days

You modeled the situation with e as the base, but solved correctly otherwise.

D. About 16 days

You modeled the situation correctly but did not apply the properties of log correctly.

E. There is not enough information to solve the problem.

If you chose this option, please contact the coordinator to discuss why you think this is the case.

General Comment: Set up the model the same as in Module 11M. Then, plug in 1000 and solve for d in your model.

---

5. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 26 liter 31 percent solution of chemical χ using two different solution percentages of chemical χ. When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 20 percent and 50 percent solutions, what was the amount she used of the 20 percent solution?

The solution is $16.47 liters$, which is option B.

A. $9.53 liters$

This is the concentration of 50 percent solution.

B. $16.47 liters$

*This is the correct option.

C. $11.85 liters$

This was a random value. If this was not a guess, contact the coordinator to talk about how you got this value.

D. $13.00 liters$

This would be correct if Brittany used equal parts of each solution.

E. There is not enough information to solve the problem.

You may have chose this if you thought you needed to know how much of the second solution was used in the problem. Remember that the total minus the first solution would give you the second amount used.

General Comment: Build the model exactly as you did in Module 9M. Then, solve for the volume you are looking for.

---

6. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of 130° *C and is placed into a* 16° *C bath to cool. After 40 minutes, the uranium has cooled to* 63° *C.*

The solution is None of the above, which is option E.

A. $k = -0.02551$

This uses A as the bath temperature and solves for k incorrectly.

B. $k = -0.02543$

This uses A as the initial temperature and solves for k correctly.

C. $k = -0.01678$

This uses A correctly and solves for k incorrectly.

D. $k = -0.01640$

This uses A as the initial temperature and solves for k incorrectly.

E. None of the above

* This is the correct answer as $k = -0.02215$.

General Comment: The initial temperature is when $t = 0$. Unlike power models, that means A is not the initial temperature!

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7. Using the situation below, construct a linear model that describes the cost of the coffee beans $C(h)$ in terms of the weight of the low-quality coffee beans h.

Veronica needs to prepare 130 of blended coffee beans selling for \$2.77 per pound. She has a high-quality bean that sells for \$3.28 a pound and a low-quality bean that sells for \$2.21 a pound.

The solution is $C(h) = -1.07h + 426.40$, which is option B.

A. $C(h) = 2.21h$

This models the cost of the low-quality bean only, not the blended beans.

B. $C(h) = -1.07h + 426.40$

* This is the correct option since the questions asked you to construct the cost model in terms of the weight of the low-quality bean.

C. $C(h) = 2.75h$

This assumes that exactly half of the high- and low- quality beans are mixed to create the blended coffee beans.

D. $C(h) = 1.07h + 287.30$

This would be correct if the question asked you to construct the cost model in terms of the weight of the high-quality bean.

E. None of the above.

If you chose this option, please talk to the coordinator to discuss why.

General Comment: This is exactly like the chemistry mixture question from the homework! If you are having trouble with this problem, be sure to review the video for building linear models.

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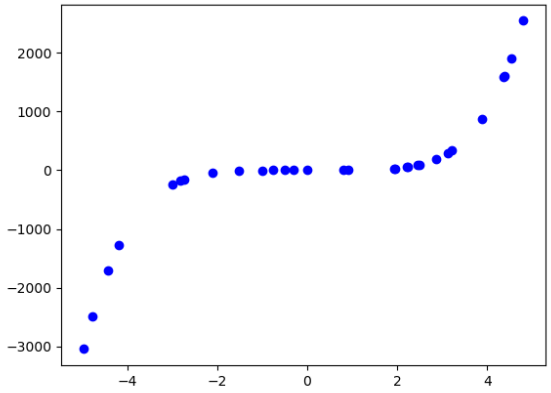
8. Determine the appropriate model for the graph of points below.



The solution is Non-linear Power model, which is option A.

A. Non-linear Power model

   For this to be the correct option, we need to see a polynomial or rational shape.

B. Linear model

   For this to be the correct option, we need to see a mostly straight line of points.

C. Exponential model

   For this to be the correct option, we want an extremely slow change early, then a rapid change later.

D. Logarithmic model

   For this to be the correct option, we want a rapid change early, then an extremely slow change later.

E. None of the above

   For this to be the correct option, we want to see no pattern in the points.

General Comment: This question is testing if you can associate the models with their graphical representation. If you are having trouble, go back to the corresponding Core module to learn about the specific function you are having trouble recognizing.

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9. Solve the modeling problem below, if possible.

A new virus is spreading throughout the world. There were initially 6 many cases reported, but the number of confirmed cases has doubled every 3 days. How long will it be until there are at least 10000 confirmed cases?

The solution is About 33 days, which is option C.

A. About 10 days

   You modeled the situation with e as the base and did not apply the properties of log correctly.

B. About 23 days

You modeled the situation with e as the base, but solved correctly otherwise.

C. About 33 days

* This is the correct option.

D. About 12 days

You modeled the situation correctly but did not apply the properties of log correctly.

E. There is not enough information to solve the problem.

If you chose this option, please contact the coordinator to discuss why you think this is the case.

General Comment: Set up the model the same as in Module 11M. Then, plug in 10000 and solve for d in your model.

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10. Solve the modeling problem below, if possible.

In CHM2045L, Brittany created a 18 liter 18 percent solution of chemical χ using two different solution percentages of chemical χ. When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 16 percent and 45 percent solutions, what was the amount she used of the 45 percent solution?

The solution is $1.24 liters$, which is option B.

A. $14.98 liters$

This was a random value. If this was not a guess, contact the coordinator to talk about how you got this value.

B. $1.24 liters$

*This is the correct option.

C. $16.76 liters$

This is the concentration of 16 percent solution.

D. $9.00 liters$

This would be correct if Brittany used equal parts of each solution.

E. There is not enough information to solve the problem.

You may have chose this if you thought you needed to know how much of the second solution was used in the problem. Remember that the total minus the first solution would give you the second amount used.

General Comment: Build the model exactly as you did in Module 9M. Then, solve for the volume you are looking for.
